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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
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JAN 27 2016

Mr. Daniel J. McClure
Senior Water Resources Control Engineer
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive #200
Rancho Cordova, CA 95670

Dear Mr. McClure:

This letter is in response to the Central Valley Regional Water Quality Control Board's (hereafter, Water Board) May 2015 Draft Scientific Peer Review, July 2015 Staff Report for the Pyrethroid Pesticides Total Maximum Daily Load (TMDL), and Basin Plan Amendment for the Sacramento and San-Joaquin River Basin. The Water Board proposes an amendment to the Basin Plan for consideration to establish a control program for pyrethroid pesticides that address waterbodies that are listed as impaired by pyrethroid pesticides on the Clean Water Act Section 303(d) list, as well as potential future impairments. The Water Board purposes to control six pyrethroid pesticides which include the active ingredients (a.i.) bifenthrin, cyfluthrin, cypermethrin, esfenvalerate, lambda-cyhalothrin, and permethrin. The proposed Basin Plan Amendment will include: acute and chronic additive numeric water quality objectives for the six pyrethroid pesticides; TMDL and other pollution controls for discharges to water bodies; and a program for implementation.

The proposed Basin Plan Amendment, TMDL development, and implementation proposed by the Water Board may affect the federally listed as endangered Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), threatened Central Valley (CV) spring-run Chinook salmon (*O. tshawytscha*), threatened California Central Valley (CCV) steelhead (*O. mykiss*), threatened Southern distinct population segment (sDPS) of North American green sturgeon (*Acipenser medirostris*), or any of their designated critical habitats in the proposed area under the Endangered Species Act (ESA). The proposed area of the Basin Plan Amendment also includes essential fish habitat (EFH) for Pacific Coast Salmon designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA).

Pyrethroid pesticides, depending on the a.i. and exposure concentration, may result in effects to salmonids and sturgeon that range from direct sub-lethal to lethal effects in the form of direct mortality or changes in growth rates and reduction of reproductive success. For example, esfenvalerate can cause behavioral and immunological effects in juvenile Chinook salmon (Clifford *et al.* 2005). Steelhead trout, when exposed to bifenthrin, experience endocrine-disruption effects on sex hormones and gonadal development (Forsgren *et al.* 2013). Behavioral or physiological responses to pesticide exposure may reduce the ability of the exposed fish to avoid predation, forage successfully, or interact successfully with their conspecifics (*i.e.*,



schooling behavior, agonistic behavior, territoriality, *etc.*) (Laetz *et al.* 2013). Studies have shown that invertebrates are more sensitive to pyrethroid than fish (Solomon *et al.* 2001, Weston *et al.* 2015), therefore salmonids can be affected indirectly through toxicity to prey organisms (Macneale *et al.* 2010, Scholz *et al.* 2012). These effects could result in reduced growth, and thus negative effects to the population (Baldwin *et al.* 2009). In addition, the interactions between pyrethroid pesticides and other chemical constituents in the receiving waters may be synergistic or antagonistic in nature (Laetz *et al.* 2009, Laetz *et al.* 2014). The combined effects on listed species and their critical habitats maybe greater that what would be anticipated by each pesticide separately.

NMFS has reviewed the information provided in the scientific peer reviewed Draft Pyrethroid Staff Report completed in July 2015, the University of California Davis Methodology report, and the six Water Quality Criteria Reports. NMFS believes that the reports provide the most up to date scientific information available and support the peer reviewed conclusions:

1. The methodology for deriving the proposed pyrethroid water quality objectives, proposed water quality criteria are scientifically sound.
2. For determining attainment of water quality objectives, it is scientifically sound to consider the six pyrethroid pesticides additively if more than one is detected in a water sample. The use of additive toxicity is consistent with the Basin Plan (Central Valley Regional Water Quality Control Board 2011).
3. The proposed TMDL loading capacity, allocations, margin of safety, and numeric targets are clearly described and consistent with attaining water quality objectives that are protective of the beneficial use(s) most sensitive to pyrethroid pesticides.


The proposed water quality objectives are protective of the most of sensitive of aquatic life (*i.e.*, *Hyalella azteca*) to acute pyrethroid exposure in the freely dissolved form. However, because salmonids occur in the proposed area where pesticides co-occur, these pesticides pose a great risk to salmonids and their habitats, particularly if they interact with other constituents (Weston *et al.* 2015). Specifically, behavioral and physiological assessment endpoints for salmonids are impacted as a result of pyrethroid exposure (chronic and sublethal). Indirect effects to salmonids could include toxicity to critical prey species, with food limitation potentially reducing growth and survival (Weston *et al.* 2015). This is particularly important for pyrethroid pesticides because they have been shown to impact aquatic life at concentration levels at or below technical detection limits. Therefore, NMFS recommends the Water Board consider expanding the analyses to include other pathways of exposure and additional water column testing to determine potential chronic effects from pyrethroid exposure.

The current proposed criteria and/or detection limits for the TMDL are low, however, pyrethroid pesticides have been shown to impact the listed anadromous fish species at concentration levels at or below technical detection limits, so there may still be an effect. Therefore, NMFS suggests that the Water Board provide more detailed information on the control program implementation and source control practices, including required actions and monitoring and surveillance requirements for agricultural, storm water, and wastewater dischargers, in order to achieve the water quality objectives and TMDLs. For example, the control program relies on existing regulatory programs for evaluating discharge from irrigated agricultural lands. The adopted

Waste Discharge requirements for irrigated agriculture (Order NO. R5-2014 and R5-2012) does not require chronic water column toxicity testing for fish species or invertebrates. NMFS recognizes the limitations of the proposed data evaluations of analytical results, thus chronic water column toxicity testing and bioassessment investigations are likely the best available methods to evaluate chronic impacts to the water column, aquatic organisms, and their habitats. Where appropriate, chronic toxicity evaluation should be required for monitoring until analytical methods are available to determine the lowest levels of pyrethroid pesticides that affect listed species and their habitat.

Please contact Dr. Melanie Okoro at (916) 930-3728, or via email at Melanie.Okoro@noaa.gov, if you have any questions regarding this letter.

Sincerely,



Maria C. Rea
Assistant Regional Administrator
California Central Valley Office

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